Harmonized analysis of microplastics: Insights from practical application within the FACTS project

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Abstract

The pollution of the environment with plastics is of emerging concern. While first initiatives aim to reduce the input of these materials, the already existing amounts pose a problem. Due to degradation and fragmentation the initially large items form micro- and nanoplastic particles. Yet the analysis of these contaminates is hampered due to increasing number of analytical pipelines and tools in the different laboratories. In the recent years, various projects aimed to provide information about these issues at different scales. Here, we present the harmonization procedures derived and applied within the "Fluxes and Fate of Microplastics in Northern European Waters" (FACTS) project. To achieve a project internal harmonization the available sampling techniques, sample extraction methods, quality assurance measures aand protocols as well as analytical techniques were collected, evaluated and finally transferred into commonly agreed harmonized procedures. These procedures were afterwards applied in the planning of a large scale sampling campaign along the Norwegian Coast and within the Bergen Fjord. This was achieved by defining the filter mesh sizes for filtration pumps and sampling nets as well as the amount of sediment sampled. In contrast to sampling, the extraction was more difficult to harmonize yet a common agreement was derived by using Fenton's reagent oxidation for the removal of organic matter and sodium bromide for density separation following the laboratory internal protocol. Finally, the for analysis FTIR microscopy shall be applied using a common database and software tool (siMPle) allowing a following pyrolysis gas chromatography-mass spectrometry (py-GC/MS) analysis. The experience during the application of these protocols within FACTS will be discussed and further contextualized with the results of the "EUROpean Quality Controlled Harmonisation Assuring Reproducible Monitoring and assessment of plastic pollution" (EUROqCHARM) project.

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